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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/516,927	12/01/2004	Lay Har Angeline Tee	DR10-006	8720
21567	7590	10/02/2006	EXAMINER	
WELLS ST. JOHN P.S. 601 W. FIRST AVENUE, SUITE 1300 SPOKANE, WA 99201			OLSEN, ALLAN W	
			ART UNIT	PAPER NUMBER
			1763	

DATE MAILED: 10/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/516,927

Applicant(s)

TEE ET AL.

Examiner

Allan Olsen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 July 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☒ Claim(s) 9-14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 December 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 4-6 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent 4,685,996 issued to Busta et al. (hereinafter, Busta).

Busta teaches a method of making a silicon probe tip. Busta teaches etching with KOH or a mixture of ethylenediamine and pyrocatechol, through a patterned mask, to form pyramidal cavities in a first layer of n-type doped silicon. Busta teaches forming a p-type doped Si layer on the layer of n-type doped silicon. Busta teaches etching away the n-type doped silicon. See: figures 1A- 1D and column 2, lines 35-68.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 2, 3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Busta.

Busta does not teach and using an electrochemical etch or using tetramethylammonium hydroxide as the etchant. Busta does not teach reversing the dopants such that the starting substrate is of the n-type Si and the probe tip is formed from p-type Si.

It would have been obvious to one skilled in the art to use an electrochemical etch or to use tetramethylammonium hydroxide as the etchant because these are well known as functionally equivalent to the silicon etching methods taught by Busta. It would have been obvious to one skilled in the art that the type of doping could be reversed, because Busta's technique relies on the etch stop that occurs at a p/n junction. With respect to the limitation of claims 3 and 4, the examiner takes Official Notice¹ that the skilled artisan would readily appreciate that the etch stop is functional regardless of the direction from which you approach the p/n junction. As such, a skilled artisan would have more than a reasonable expectation of success upon reversing the polarity of the process.

Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 4,685,996 issued to Gray et al. (hereinafter, Gray) in view of U S Patent 6,156,216 issued to Manalis et al. (hereinafter, Manalis).

Gray teaches a method of forming a probe tip by etching pyramidal cavities into doped silicon then depositing probe material into the cavity and etching away the doped

¹ Supporting documentation. See, for example, column 8, lines 57-65 of US 6,765,300 and column 3, lines 34-36 and 50-64 of US 5,066,358.

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silicon. Gray teaches the probe material can be a metal or a semiconductor. Gray teaches etching with KOH or ethylenediamine/pyrocatechol. See figures 7-14

Gray does not teach using silicon for the probe material. Gray does not teach using an electrochemical etch or using tetramethylammonium hydroxide as the etchant.

Manalis teaches making probe tips from doped silicon (column 3, line 30 - column 4, line 10).

It would have been obvious to one skilled in the art to deposit oppositely doped silicon as the probe material when carrying out the method of Gray because Gray teaches that the probe material can be a semiconductor and Manalis teaches that doped silicon probes tips are very useful for atomic force microscopes (column 4, lines 6-10) and it is widely known that the junction between two differently doped silicon layers creates an etch stop. It would have been obvious to one skilled in the art to use an electrochemical etch or to use tetramethylammonium hydroxide as the etchant because these are well known as functionally equivalent to the silicon etching methods taught by Gray. With respect to the limitation of claims 3 and 4, the examiner takes Official Notice¹ that the skilled artisan would readily appreciate that the etch stop is functional regardless of the direction from which you approach the p/n junction. As such, a skilled artisan would have more than a reasonable expectation of success upon reversing the polarity of the process.

Allowable Subject Matter

Claims 9-14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments filed July 27, 2006 have been fully considered but they are not persuasive.

With respect to Busta applicant argues that Busta does not teach depositing a doped layer of silicon upon a doped silicon substrate wherein the two doped silicon components are oppositely doped.

The examiner notes that Busta teaches etching a pyramidal cavity into an n-type Silicon substrate. As shown in figure 1B, Busta teaches provides layer 16 on the n-type doped Si. Layer 16 is a layer of p⁺-type silicon and is therefore doped opposite with respect to the n-type silicon base. Given that the provision of layer 16 is an additive process resulting in a newly formed layer of oppositely doped Si, the process of Busta is viewed as a deposition that reads on applicant's claimed deposition of an oppositely doped silicon layer.

Applicant also argues that Busta teaches a p⁺ etch stop and not a diode junction etch stop. So, applicant asserts, it would not be obvious to a person skilled in the art to use an electrochemical etch. However, Busta teaches the provision of a p⁺ layer onto

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an n-silicon substrate. As such, the interface of the oppositely doped silicon layers is in fact a diode junction.

With respect to the limitation of claims 3 and 4, applicant simply asserts that it would not be obvious to one skilled in the art that the type of doping can be reversed. This assertion is made without addressing the reasoning set forth by the examiner as to why this aspect of the invention would have been obvious.

With respect to Gray and Manalis, without addressing the reasoning set forth by the examiner, applicant simply asserts "it would not be obvious to a person skilled in the art to think of an oppositely doped silicon but rather another material other than silicon for the probe".

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

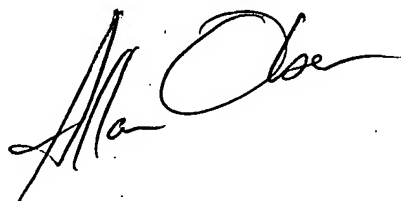
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allan Olsen whose telephone number is 571-272-1441.

The examiner can normally be reached on M, W and F: 1-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Allan Olsen', is written over a horizontal line.

Allan Olsen
Primary Examiner
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